

WHAT IS CLAIMED IS:

1. A continuously variable transmission apparatus,
comprising:

5 an input shaft;

a toroidal-type continuously variable transmission
disposed concentrically with the input shaft, including
an input portion and an output portion and using the input
shaft as the input portion thereof;

10 a rotation transmission shaft disposed in parallel
to the input shaft;

first, second and third planetary-gear-type
transmissions disposed concentrically with each other
on the periphery of the rotation transmission shaft;

15 the first planetary-gear-type transmission
including a first sun gear, a first ring gear, a plurality
of first planetary gears meshingly engaged with the first
sun and ring gears, and a first carrier supporting the
respective first planetary gears so as to be rotated;

20 the second planetary-gear-type transmission
including a second sun gear, a second ring gear, a plurality
of second planetary gears meshingly engaged with the
second sun and ring gears, and a second carrier supporting
the respective second planetary gears so as to be rotated;

25 the third planetary-gear-type transmission

including a third sun gear, a third ring gear, a plurality of third planetary gears meshingly engaged with the third sun and ring gears, and a third carrier supporting the respective third planetary gears so as to be rotated;

5 an output gear disposed concentrically with the rotation transmission shaft;

 a first power transmission mechanism for transmitting the rotation of the input shaft to the first ring gear or the first carrier constituting the first
10 planetary-gear-type transmission;

 a second power transmission mechanism for transmitting the rotation between the output portion of the toroidal-type continuously variable transmission and the rotation transmission shaft;

15 a third power transmission mechanism for transmitting the rotation of the input shaft to the third carrier or the third carrier constituting the third planetary-gear-type transmission; and,

 a switching mechanism for switching the power
20 transmission states between the input shaft and the output shaft through the first, second and third power transmission mechanisms,

 wherein not only the second sun gear and one of the first and third sun gears are rotated together with the
25 rotation transmission shaft to thereby execute the power

transmission through the rotation transmission shaft and one of the first and second planetary-gear-type transmissions,

but also, in a state where the power transmission
5 through the third planetary-gear-type transmission is cut off, in accordance with the control of the transmission ratio of the toroidal-type continuously variable transmission, the output shaft is stopped while the input shaft is rotating.

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2. A continuously variable transmission apparatus, comprising:

an input shaft;

a toroidal-type continuously variable transmission
15 disposed concentrically with the input shaft, including an input portion and an output portion and using the input shaft as the input portion thereof;

a rotation transmission shaft disposed in parallel to the input shaft;

20 first, second and third planetary-gear-type transmissions disposed concentrically with each other on the periphery of the rotation transmission shaft;

the first planetary-gear-type transmission including a first sun gear, a first ring gear, a plurality
25 of first planetary gears meshingly engaged with the first

sun and ring gears, and a first carrier supporting the respective first planetary gears so as to be rotated;

the second planetary-gear-type transmission including a second sun gear, a second ring gear, a plurality
5 of second planetary gears meshingly engaged with the second sun and ring gears, and a second carrier supporting the respective second planetary gears so as to be rotated;

the third planetary-gear-type transmission including a third sun gear, a third ring gear, a plurality
10 of third planetary gears meshingly engaged with the third sun and ring gears, and a third carrier supporting the respective third planetary gears so as to be rotated;

an output gear disposed concentrically with the rotation transmission shaft;

15 a first power transmission mechanism for transmitting the rotation of the input shaft to the first ring gear constituting the first planetary-gear-type transmission;

a second power transmission mechanism for
20 transmitting the rotation between the output portion of the toroidal-type continuously variable transmission and the rotation transmission shaft;

a third power transmission mechanism for transmitting the rotation of the input shaft to the third
25 ring gear constituting the third planetary-gear-type

transmission;

a low-speed clutch for permitting and prohibiting the transmission of the power between the input shaft and the first ring gear; and,

5 a high-speed clutch for permitting and prohibiting the transmission of the power between the third power transmission mechanism and the third planetary-gear-type transmission,

wherein the first and second sun gears are rotated
10 together with the rotation transmission shaft, the first carrier constituting the first planetary-gear-type transmission is connected with not only the output shaft but also the second ring gear constituting the second planetary-gear-type transmission, the second carrier
15 constituting the second planetary-gear-type transmission is connected with the third carrier constituting the third planetary-gear-type transmission, and, in a state where the low-speed clutch is connected and the connection of the high-speed clutch
20 is cut off, in accordance with the control of the transmission ratio of the toroidal-type continuously variable transmission, the output shaft is stopped while the input shaft is rotating.

25 3. A continuously variable transmission apparatus,

comprising:

an input shaft;

a toroidal-type continuously variable transmission disposed concentrically with the input shaft, including
5 an input portion and an output portion and using the input shaft as the input portion thereof;

a rotation transmission shaft disposed in parallel to the input shaft;

first, second and third planetary-gear-type
10 transmissions disposed concentrically with each other on the periphery of the rotation transmission shaft;

the first planetary-gear-type transmission including a first sun gear, a first ring gear, a plurality of first planetary gears meshingly engaged with the first
15 sun and ring gears, and a first carrier supporting the respective first planetary gears so as to be rotated;

the second planetary-gear-type transmission including a second sun gear, a second ring gear, a plurality of second planetary gears meshingly engaged with the
20 second sun and ring gears, and a second carrier supporting the respective second planetary gears so as to be rotated;

the third planetary-gear-type transmission including a third sun gear, a third ring gear, a plurality of third planetary gears meshingly engaged with the third
25 sun and ring gears, and a third carrier supporting the

respective third planetary gears so as to be rotated;

an output gear disposed concentrically with the rotation transmission shaft;

a first power transmission mechanism for
5 transmitting the rotation of the input shaft to the first carrier constituting the first planetary-gear-type transmission;

a second power transmission mechanism for transmitting the rotation between the output portion of
10 the toroidal-type continuously variable transmission and the rotation transmission shaft;

a third power transmission mechanism for transmitting the rotation of the input shaft to the third ring gear constituting the third planetary-gear-type
15 transmission;

a low-speed clutch for permitting and prohibiting the transmission of the power between the input shaft and the first planetary-gear-type transmission; and,

a high-speed clutch for permitting and prohibiting
20 the transmission of the power between the input shaft and the third carrier,

wherein the second and third sun gears are rotated together with the rotation transmission shaft, the first and second ring gears constituting the first and second
25 planetary-gear-type transmissions respectively are

connected with each other, the second carrier constituting
the second planetary-gear-type transmission is connected
with not only the output shaft but also the third ring
gear constituting the third planetary-gear-type
5 transmission, and, in a state where the low-speed clutch
is connected and the connection of the high-speed clutch
is cut off, in accordance with the control of the
transmission ratio of the toroidal-type continuously
variable transmission, the output shaft is stopped while
10 the input shaft is rotating.